

Amendments to the Claims

The current listing of the claims replaces all previous amendments and listings of the claims.

Claim 1 (Original): An objective lens drive apparatus for use in an optical pickup, comprising:

a magnetic circuit including a magnet magnetized in at least three polarities; and
a coil unit including a focus coil, a tracking coil and a tilt coil,
wherein the focus coil, the tracking coil and the tilt coil are disposed within a magnetic gap of the magnetic circuit.

Claim 2 (Original): An objective lens drive apparatus according to claim 1, wherein the magnet is magnetized in four polarities.

Claim 3 (Withdrawn): An objective lens drive apparatus according to claim 1, wherein the magnet is magnetized in three polarities.

Claim 4 (Withdrawn): An objective lens drive apparatus according to claim 1,
wherein the number of the focus coils is two, the number of the tracking coils is two,
and the number of the tilt coils is two,
wherein the magnet includes two magnet sections respectively disposed in two upper and lower stages in a focus direction and each magnet section magnetized in two polarities in a tracking direction, whereby said the has four poles magnetized.

Claim 5 (Withdrawn): An objective lens drive apparatus according to claim 1,
wherein the number of the focus coils is four, the number of the tracking coils is two,
and the number of the tilt coils is four,

wherein one pole of said magnet has an I-shaped front surface, and two other poles
each having a quadrilateral-shaped front surface are inserted into the other space of the one
pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three
poles magnetized.

Claim 6 (Withdrawn): An objective lens drive apparatus according to claim 1,
wherein the number of said focus coils is two, the number of said tracking coils is
four, and the number of said tilt coils is four,

wherein one pole of said magnet has an H-shaped front surface, and two other poles
each having a quadrilateral-shaped front surface are inserted into the other space of said one
pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three
poles magnetized.

Claim 7 (Withdrawn): An objective lens drive apparatus according to claim 1,
wherein the number of said focus coils is two, the number of said tracking coils is
two, and the number of said tilt coils is four,

wherein one pole of said magnet has a T-shaped front surface, and two other poles
each having a quadrilateral-shaped front surface are inserted into the other space of said one
pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three
poles magnetized.

Claim 8 (Previously Presented): An objective lens drive apparatus according to claim 1, wherein the magnetic circuit includes a plurality of magnets, and the coil unit is disposed within the magnetic gap formed by the magnets.

Claim 9 (Withdrawn): An objective lens drive apparatus according to claim 1, wherein the coil unit includes a plurality of printed circuit boards, and the focus coil, the tracking coil and the tilt coil are separately mounted on the printed circuit boards.

Claim 10 (Withdrawn): An objective lens drive apparatus according to claim 1, wherein the coil unit includes a plurality of first printed circuit boards and second printed boards, and the focus coil and the tracking coil are mounted on the first printed circuit board and the tilt coil is mounted on the second printed board.

Claim 11 (Withdrawn): An objective lens drive apparatus according to claim 1, wherein the coil unit includes a plurality of first printed circuit boards and second printed boards, and the focus coil and the tilt coil are mounted on the first printed circuit board and the tracking coil is mounted on the second printed board.

Claim 12 (Previously Presented): An objective lens drive apparatus for use in an optical pickup, comprising:

two magnetic circuits each including a magnet magnetized in at least three polarities;
and

a coil unit including a focus coil, a tracking coil and a tilt coil,
wherein the focus coil, the tracking coil and the tilt coil are disposed within a magnetic gap of one of the magnetic circuits.

Claim 13 (Original): An objective lens drive apparatus according to claim 12, wherein the magnet is magnetized in four polarities.

Claim 14 (Withdrawn): An objective lens drive apparatus according to claim 12, wherein the magnet is magnetized in three polarities.

Claim 15 (Withdrawn): An objective lens drive apparatus according to claim 12, wherein the number of the focus coils is two, the number of the tracking coils is two, and the number of the tilt coils is two, while said magnet includes two magnet sections respectively disposed in two upper and lower stages in a focus direction and each magnet section magnetized in two polarities in a tracking direction, whereby said the has four poles magnetized.

Claim 16 (Withdrawn): An objective lens drive apparatus according to claim 12, wherein the number of the focus coils is four, the number of the tracking coils is two, and the number of the tilt coils is four,

wherein one pole of said magnet has an I-shaped front surface, and two other poles each having a quadrilateral-shaped front surface are inserted into the other space of said one pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three poles magnetized.

Claim 17 (Withdrawn): An objective lens drive apparatus according to claim 12, wherein the number of said focus coils is two, the number of said tracking coils is four, and the number of said tilt coils is four,

wherein one pole of said magnet has an H-shaped front surface, and two other poles each having a quadrilateral-shaped front surface are inserted into the other space of said one pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three poles magnetized.

Claim 18 (Withdrawn): An objective lens drive apparatus according to claim 12, wherein the number of said focus coils is two, the number of said tracking coils is two, and the number of said tilt coils is four,

wherein one pole of said magnet has a T-shaped front surface, and two other poles each having a quadrilateral-shaped front surface are inserted into the other space of said one pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three poles magnetized.

Claim 19 (Previously Presented): An objective lens drive apparatus according to claim 12, wherein one of the magnetic circuits includes a plurality of magnets, and the coil unit is disposed within the magnetic gap.

Claim 20 (Previously Presented): An objective lens drive apparatus according to claim 12, wherein the coil unit includes a plurality of printed circuit boards, and the focus coil, the tracking coil and the tilt coil are separately mounted on the printed circuit boards.

Claim 21 (Previously Presented): An objective lens drive apparatus according to claim 12, wherein the coil unit includes a plurality of first printed circuit boards and second printed boards, and the focus coil and the tracking coil are mounted on the first printed circuit board and the tilt coil is mounted on the second printed board.

Claim 22 (Previously Presented): An objective lens drive apparatus according to claim 12, wherein the coil unit includes a plurality of first printed circuit boards and second printed boards, and the focus coil and the tilt coil are mounted on the first printed circuit board and the tracking coil is mounted on the second printed board.

Claim 23 (Original): An objective lens drive apparatus according to claim 8, wherein the coil unit is fixed to the two side surfaces of a lens holder extending in parallel with a tracking direction.

Claim 24 (Currently Amended): An objective lens drive apparatus used in an optical pickup for detecting ~~the~~ an inclination of an optical disk to adjust the inclination of an objective lens in accordance with an inclination signal of the optical disk, comprising:

a magnetic circuit including a magnet magnetized in at least three polarities; and

a coil unit including a focus coil, a tracking coil and a tilt coil,

wherein the focus coil, the tracking coil and the tilt coil are disposed within a magnetic gap of the magnetic circuit,

wherein a focus servo is executed by supplying currents respectively to a plurality of the focus coils due to ~~the~~ a sum of drive forces generated in the plurality of focus coils,

wherein the inclination adjustment of the objective lens is executed by generating moment around ~~the~~ a center of gravity of a movable part due to ~~the~~ a difference between the drive forces.

Claim 25 (Original): An objective lens drive apparatus according to claim 24, wherein the magnet is magnetized in four polarities.

Claim 26 (Withdrawn): An objective lens drive apparatus according to claim 24, wherein the magnet is magnetized in three polarities.

Claim 27 (Withdrawn): An objective lens drive apparatus according to claim 24, wherein the number of the focus coils is two, and the number of the tracking coils is two,

wherein said magnet includes two magnet sections respectively disposed in two upper and lower stages in a focus direction and each magnet section magnetized in two polarities in a tracking direction, whereby said the has four poles magnetized.

Claim 28 (Original): An objective lens drive apparatus according to claim 24, wherein the number of the focus coils is four and the number of the tracking coils is two,

wherein one pole of said magnet has an I-shaped front surface, and two other poles each having a quadrilateral-shaped front surface are inserted into the space of said one pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three poles magnetized.

Claim 29 (Withdrawn): An objective lens drive apparatus according to claim 24, wherein the number of said focus coils is two and the number of said tracking coils is two,

wherein one pole of said magnet has a T-shaped front surface, and two other poles each having a quadrilateral-shaped front surface are inserted into the space of said one pole,

whereby said magnet has a quadrilateral-shaped front surface as a whole and has three poles magnetized.

Claim 30 (Currently Amended): An objective lens drive apparatus according to claim 24, wherein the magnetic circuit includes a plurality of ~~the magnet~~ magnets, and the coil unit is disposed within the magnetic gap formed by the magnets.

Claim 31 (Withdrawn - Currently Amended): An objective lens drive apparatus according to claim 24, wherein the coil unit includes a plurality of printed circuit boards, and the focus coil and the tracking coil are separately mounted on at least one of the printed circuit boards.

Claim 32 (Currently Amended): An objective lens drive apparatus according to claim 24, wherein the coil unit includes ~~a plurality of a printed circuit boards~~ board, and the focus coil and the tracking coil are mounted on the printed circuit board.

Claim 33 (Currently Amended): An objective lens drive apparatus used in an optical pickup for detecting ~~the~~ an inclination of an optical disk to adjust the inclination of an objective lens in accordance with an inclination signal of the optical disk, comprising:
a magnetic circuit including a magnet magnetized in at least three polarities; and
a coil unit including a focus coil, a tracking coil and a tilt coil,
wherein the focus coil, the tracking coil and the tilt coil are disposed within a magnetic gap of the magnetic circuit,

wherein a tracking servo is executed by supplying currents respectively to a plurality of the tracking coils due to ~~the~~ a sum of drive forces generated in the plurality of focus coils,

wherein the inclination adjustment of the objective lens is executed by generating moment around ~~the~~ a center of gravity of a movable part due to ~~the~~ a difference between the drive forces.

Claim 34 (Original): An objective lens drive apparatus according to claim 33, wherein the magnet is magnetized in four polarities.

Claim 35 (Withdrawn): An objective lens drive apparatus according to claim 33, wherein the magnet is magnetized in three polarities.

Claim 36 (Withdrawn): An objective lens drive apparatus according to claim 33, wherein the number of the focus coils is two and the number of the tracking coils is two

wherein the magnet includes two magnet sections respectively disposed in two upper and lower stages in a focus direction and each magnet section magnetized in two polarities in a tracking direction, whereby said the has four poles magnetized.

Claim 37 (Withdrawn): An objective lens drive apparatus according to claim 33, wherein the number of said focus coils is two and the number of said tracking coils is four,

wherein one pole of said magnet has an H-shaped front surface, and two other poles each having a quadrilateral-shaped front surface are inserted into the space of said one pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three poles magnetized.

Claim 38 (Currently Amended): An objective lens drive apparatus according to claim 33, wherein the magnetic circuit includes a plurality of ~~the magnet~~ magnets, and the coil unit is disposed within the magnetic gap formed by the magnet gaps.

Claim 39 (Withdrawn - Currently Amended): An objective lens drive apparatus according to claim 33, wherein the coil unit includes a plurality of printed circuit boards, and the focus coil and the tracking coil are separately mounted on at least one of the printed circuit boards.

Claim 40 (Currently Amended): An objective lens drive apparatus according to claim 33, wherein the coil unit includes ~~a plurality of~~ a printed circuit board, and the focus coil and the tracking coil are mounted on the printed circuit board.

Claim 41 (Currently Amended): An objective lens drive apparatus used in an optical pickup for detecting ~~the~~ an inclination of an optical disk to adjust the inclination of an objective lens in accordance with an inclination signal of the optical disk, comprising:
two magnetic circuits respectively including a magnet magnetized in at least three polarities; and

a coil unit including a focus coil, a tracking coil and a tilt coil,
wherein the focus coil, the tracking coil and the tilt coil are disposed within a magnetic gap of the magnetic circuit,

wherein a focus servo is executed by supplying currents respectively to a plurality of the focus coils due to ~~the~~ a sum of drive forces generated in the plurality of focus coils,

wherein the inclination adjustment of the objective lens is executed by generating moment around ~~the~~ a center of gravity of a movable part due to ~~the~~ a difference between the drive forces.

Claim 42 (Original): An objective lens drive apparatus according to claim 41, wherein the magnet is magnetized in four polarities.

Claim 43 (Withdrawn): An objective lens drive apparatus according to claim 41, wherein the magnet is magnetized in three polarities.

Claim 44 (Withdrawn): An objective lens drive apparatus according to claim 41, wherein the number of the focus coils is two and the number of the tracking coils is two,

wherein the magnet includes two magnet sections respectively disposed in two upper and lower stages in a focus direction and each magnet section magnetized in two polarities in a tracking direction, whereby said the has four poles magnetized.

Claim 45 (Withdrawn): An objective lens drive apparatus according to claim 41, wherein the number of the focus coils is four and the number of the tracking coils is two,

wherein one pole of said magnet has an I-shaped front surface, and two other poles each having a quadrilateral-shaped front surface are inserted into the space of said one pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three poles magnetized.

Claim 46 (Withdrawn): An objective lens drive apparatus according to claim 41, wherein the number of said focus coils is two and the number of said tracking coils is two,

wherein one pole of said magnet has a T-shaped front surface, and two other poles each having a quadrilateral-shaped front surface are inserted into the space of said one pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three poles magnetized.

Claim 47 (Currently Amended): An objective lens drive apparatus according to claim 41, wherein the magnetic circuit includes a plurality of ~~the magnet~~ magnets, and the coil unit is disposed within the magnetic gap formed by the magnets.

Claim 48 (Withdrawn - Currently Amended): An objective lens drive apparatus according to claim 41, wherein the coil unit includes a plurality of printed circuit boards, and the focus coil and the tracking coil are separately mounted on at least one of the printed circuit boards.

Claim 49 (Currently Amended): An objective lens drive apparatus according to claim 41, wherein the coil unit includes ~~a plurality of a printed circuit boards~~ board, and the focus coil and the tracking coil are mounted on the printed circuit board.

Claim 50 (Currently Amended): An objective lens drive apparatus used in an optical pickup for detecting ~~the~~ an inclination of an optical disk to adjust the inclination of an objective lens in accordance with an inclination signal of the optical disk, comprising:

two magnetic circuits respectively including a magnet magnetized in at least three polarities; and

a coil unit including a focus coil, a tracking coil and a tilt coil,

wherein the focus coil, the tracking coil and the tilt coil are disposed within a magnetic gap of the magnetic circuit,

wherein a tracking servo is executed by supplying currents respectively to a plurality of the tracking coils due to ~~the~~ a sum of drive forces generated in the plurality of focus coils,

wherein the inclination adjustment of the objective lens is executed by generating moment around ~~the~~ a center of gravity of a movable part due to ~~the~~ a difference between the drive forces.

Claim 51 (Original): An objective lens drive apparatus according to claim 50, wherein the magnet is magnetized in four polarities.

Claim 52 (Withdrawn): An objective lens drive apparatus according to claim 50, wherein the magnet is magnetized in three polarities.

Claim 53 (Withdrawn): An objective lens drive apparatus according to claim 50, wherein the number of the focus coils is two and the number of the tracking coils is two,

wherein the magnet includes two magnet sections respectively disposed in two upper and lower stages in a focus direction and each magnet section magnetized in two polarities in a tracking direction, whereby said the has four poles magnetized.

Claim 54 (Withdrawn): An objective lens drive apparatus according to claim 50,

wherein the number of said focus coils is two and the number of said tracking coils is four,

wherein one pole of said magnet has an H-shaped front surface, and two other poles each having a quadrilateral-shaped front surface are inserted into the space of said one pole, whereby said magnet has a quadrilateral-shaped front surface as a whole and has three poles magnetized.

Claim 55 (Currently Amended): An objective lens drive apparatus according to claim 50, wherein the magnetic circuit includes a plurality of ~~the magnet~~ magnets, and the coil unit is disposed within the magnetic gap formed by the magnet gaps.

Claim 56 (Withdrawn - Currently Amended): An objective lens drive apparatus according to claim 50, wherein the coil unit includes a plurality of printed circuit boards, and the focus coil and the tracking coil are separately mounted on at least one of the printed circuit boards.

Claim 57 (Currently Amended): An objective lens drive apparatus according to claim 50, wherein the coil unit includes ~~a plurality of~~ a printed circuit board, and the focus coil and the tracking coil are mounted on the printed circuit board.